R E G I O N 22

(MINNESOTA)

REGIONAL PLAN

For The Use Of 800 MHz Channels

601 Through 830

Within The State Of Minnesota

GEN Docket 87-112

Report and Order 87-359

Recommended For Use By The

NATIONAL PUBLIC SAFETY PLANNING ADVISORY COMMITTEE (NPSPAC)

and the

MINNESOTA REGION 22 PLANNING COMMITTEE

DECEMBER 1992

HENNEPIN

INFORMATION SERVICES
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A-023 Government Center
Minneapolis, MN 55487-0007

January 6, 1993

SECRETARY,
FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, D.C. 20554

Dear Secretary:

In response to Report and Order 87-359 on Gen Docket 87-112 the Regional Plan for Region 22 (Minnesota) is hereby submitted to the Commission on this date for its consideration.

Enclosed are six (6) copies of this Regional Plan.

Respectfully submitted,

H. P. Hillegas

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R E G I O N 22

(MINNESOTA)

REGIONAL PLAN

PREFACE

Responding to direction by the United States Congress in 1983 the Federal Communications Commission (FCC) adopted Report and Order 87-359 on November 24, 1987 for General Docket 87-112 to accomplish the following:

> "Development and Implementation of a Public Safety National Plan and amendment of Part 90 to Establish Service Rules and Technical Standards for Use of the 821-824/ 866-869 MHz Bands by the Public Safety Services"

This action made available to the Public Safety entities an additional 230 radio channels in the 821/824-866/869 MHz bands.

The Commission had established the National Public Safety Planning Advisory Committee (NPSPAC) in 1986 for the purpose of involving interested parties in a Public Safety planning effort and with the following specific tasks:

1. Identify communications requirements of Public Safety services.

2. Develop a scheme for efficient use of the new frequencies.

3. Develop a scheme to increase utility of existing public safety frequencies.

4. Recommend the manner in which new technologies can be applied to public safety frequencies.

5. Recommend guidelines to insure compliance with the National Plan.

In the structure of the National Plan proposed by the FCC the United States was divided into "regions" which, in many instances, coincided with the boundaries of individual states. The state of Minnesota was identified as Region 22.

The Report and Order specified that authorizations for use of these channels would not be made within the region until a formal "Regional Plan" had been prepared, filed with and approved by the FCC. The Associated Public Safety Communications Officers, Inc. (APCO) was given the responsibility of convening a meeting to initiate the planning process within each region that would lead to the preparation of this Regional Plan.

This document has been prepared, in the manner described therein, to fulfill that FCC requirement and is respectfully submitted to the FEDERAL COMMUNICATION COMMISSION this 6th day of January 1993 for its consideration.

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FOREWORD

For those individuals who have been involved with the planning of Public Safety Land Mobile Radio systems and are familiar with frequency coordination guidelines for such systems, it will be immediately recognized that the technical requirements set forth for these particular 800 MHz channels, as they relate to the confinement of signal propagation, are considerably more stringent than what has been previously required for other commonly used Public Safety radio frequencies.

In most heavily populated areas of the country, and certainly within many areas within the State of Minnesota, public safety communications has for years been seriously compromised by frequency congestion and destructive interference from nearby adjacent and co-channel users. At first glance the 230 additional radio channels, recently made available by the FCC in the " NPSPAC" (National Public Safety Planning Advisory Committee) allocation and contained in this Plan, may appear to be a lasting solution to such problems. It can only approach that however, if we plan, manage and continue to use these, and all other channels, in the most possible efficient manner.

Strict limitations are essential and will be placed on the geographical area over which a user's communication system, utilizing these NPSPAC channels, can propagate. Limitations

Being able to communicate with other Public Safety agencies during major disasters when joint response is being made has been a serious shortcoming in many present day systems. In this NPSPAC allocation of frequencies the FCC has mandated that five (5) specific channels be used for "common channel" use throughout the nation thereby providing a communication link among all jurisdictions in areas using the NPSPAC channels. All 800 MHz systems utilizing NPSPAC channels will be required to include these "common channels" in their system so that this very essential objective will be achieved.

Three (3) additional channels in the 806/821 MHz Public Safety group have also been set aside in Minnesota for similar "common channel" usage.

The radio channels contained in this allocation are primarily intended to be used in systems utilizing "trunking technology" and in fact is required by the FCC in any system utilizing five (5) or more channels. Although systems utilizing less that five (5) channels are not required to "trunk", adjacent jurisdictions, and even counties may find it rewarding and cost effective to combine their channels and utilize "trunking technology". This technique not only may prove cost effective but also would allow such users to realize the many other benefits of a "trunked" radio system that otherwise may not be affordable.

In some of the less populated counties of the state where "trunking systems" are not needed, or contemplated, the use of the 800 MHz radio channels contained in this Plan with their seemingly stringent restrictions may be inappropriate. For those particular applications there are numerous other similar 800 MHz channels that have no "trunking" requirements, or the stringent restrictions on antenna height, and coverage, that are attached to the NPSPAC channels. At the time of this writing such channels are for the most part very lightly used throughout the state of Minnesota and are available for both "conventional" and "trunking" system use by all Public Safety jurisdictions through the normal FCC application procedures.

In the more heavily populated areas of the state however these new radio channels, when properly planned and used,

ACKNOWLEDGMENTS

Sincere appreciation is expressed to each individual who has participated in the formation of this Regional Plan. Many hours of time, and travel by many, have been spent during the last four years in helping put it together.

We are certain too that all members, and the agencies they represent, will appreciate the action taken by the Federal Communications Commission in recognizing and responding to the communications problems faced by many Public Safety agencies. These additional radio channels, being made available through the NPSPAC docket, will make it possible to take advantage of the much needed new technology that is now emerging for public safety communications systems.

The Regional Planning Committee appreciates the assistance of the National Office of "APCO" (Associated Public Safety Communications Officers Inc.), for their work and expense in performing the frequency "sort" and "packing" which is the basis for the distribution of channels listed in this Plan.

Our appreciation is also extended to the Minnesota Chapter of APCO for their financial contribution to cover the expense of printing and distribution of this Regional Plan.

H. P. Hillegas
Chairman
Region 22 (Minnesota) Planning Committee

1.0 SCOPE:

1.1 INTRODUCTION:

In December of 1983, the United States Congress directed the Federal Communications Commission (FCC) to establish a plan to ensure that the communications needs of state and local public safety authorities would be met. By their regular means of initiation, the FCC began the process of developing such a plan. Through their efforts, and the efforts of the National Public Safety Planning Advisory Committee (NPSPAC) the plan was begun.

The National Public Safety Planning Advisory Committee provided an opportunity for the public safety community and other interested members of the public to participate in an overall spectrum management approach by recommending policy guidelines, clinical standards, and procedures to satisfy public safety needs for the foreseeable future. After consideration of NPSPAC's Final Report and comments filed in Docket No. 87-112, a Report and Order was released by the FCC in December 1987, which established a structure for the National Plan that consists of guidelines for the development of regional plans.

The National Plan provides guidelines for the development of regional plans. The particulars of this plan are found in FCC Docket 87-259 which

Trunking technology will greatly improve on the utilization of the limited spectrum thus providing room for growth as the demands for public safety services increases. Trunking will provide greater compatibility of communications systems when emergency conditions require coordinated responses by other jurisdictions and departments. Public Safety communications systems in different jurisdictions, and in many instances even within the same jurisdiction, are not always compatible with each other, thus placing seriousy limitations on their ability to communicate when joint responses are required. Although a nationwide Police channel is available that permits Law Enforcement personnel to communicate across jurisdictions, other Public Safety fleets do not have access to this or another similar common channel.

This regional plan was developed with the objective of assuring all levels of Public Safety and Public Service agencies that radio communications in the near and distant future will not suffer from the problems of the past. The allocation of frequencies was done in as equitable a way as possible. A minimum of four (4) channels were allocated for use in each

which are bound to occur in public safety and public service communications operations long into the future.

2.0 AUTHORITY:

2.1 REGIONAL PLANNING COMMITTEE::

The development of the Public-Safety Radio Communications Plan for Region 22, the State of Minnesota, has followed the requirements of the FCC's Report and Order as issued in the matter of General Docket 87-112.

In accordance with the FCC's Report and Order 87-112, the Associated Public-Safety Communications Officers Inc. (APCO) recommended to the Commission the appointment of a "Convenor" for Minnesota Region 22. The Convenor served as the coordinator for the assembly and formation of the planning committee.

Participants in the formation of the Regional Planning Committee represent interested parties from both the Public Safety and Special Emergency Radio Services. A total of forty (40) individuals have attended meetings and participated in the development process. Exhibit "B" contains the names, telephone numbers, organizational affiliations, and mailing addresses of all participants in the meetings of the Regional Planning Committee.

The committee was selected by attendance at the planning meetings. Each member of the Committee representing an eligible licensee under the Public Safety Radio Services and the Special Emergency Radio Services was permitted to participate in all discussions at committee meetings. Except as may be provided elsewhere in the Plan, the majority of those present at a scheduled meeting constituted a majority for all business. Final approval of the plan, prior to submission to the FCC, was sought by a vote at the last meeting. A mail-back ballot was provided with the meeting notice for those members who could not attend. For this final approval therefore, votes from more than would be in attendance at a regular meeting was possible thus providing all those who had participated in the planning process an opportunity to vote on the final draft. This way, the finished plan was reviewed and accepted by the widest, within reason, group of public safety/public service users.

2.2 NOTIFICATION TO CONVENE:

Several methods of notification were used to invite interested parties to participate in the development of this plan.

On May 10, 1988 information about the project was sent to the following organizations, requesting them to make their members aware of the committee's activities. Recipients of this letter were the following organizations:

1. Minnesota State Sheriff's Association.
2. Minnesota Veterinary Medical Association.
3. Executive Director AASHTO.
4. Minnesota Fire Chief's Association.
5. Minnesota Police Chief's Association.
6. Minnesota Dept. of Health.
7. Minnesota Association of Counties.
8. Minnesota League of Cities.
9. Minnesota Medical Association.
10. National Office APCO
11. St. Paul FCC Office

Letters were also sent to all members of the Minnesota Chapter of APCO.

A Public Notice, announcing the date of the first organizational meeting to be held on July 13, 1988, was run in the May 30, 1988 issue of the State

agencies were sent all announcements for meetings and bulletins of progress.

Requirements for a regional planning committee were presented and discussed at the organizational meeting. At this first meeting and at each

Exhibit "B" contains a roster of all individuals attending Region 22's 800 MHz Planning Committee meetings.

2.5 **REGION PLAN APPROVAL:**
The proposed revisions to the Region Plan draft were submitted to a total of fifty-five (55) individuals who had participated in the region planning process. Those individuals who are employed by public safety organizations eligible to use Public Safety radio channels and had attended at least one meeting, were invited to a final committee meeting, scheduled for December 9, 1992, to resolve the remaining issues. A mail-back ballot was included with the meeting notice for use by those who could not attend the meeting. Two (2) ballots were returned, in favor of the changes, prior to the meeting. Eighteen (18) individuals attended this meeting and voted 15 to 1 in favor of the proposed revisions. The entire plan was also approved by voice vote 15 to 1.

3.0 **NATIONAL INTER-RELATIONSHIPS:**
The Regional Plan is in conformity with the National Plan. If there is a conflict between the two plans, the National Plan will govern. It is expected that Regional Plans for other areas of the country may differ from this plan due to the broad differences in circumstance, geography, and population density. By officially sanctioning this plan the Federal Communications Commission agrees to its conformity to the National Plan. Nothing in the Plan is to interfere with the proper functions and duties of the organizations appointed by the FCC for frequency coordination in the Private Land Mobile Radio Services, but rather it provides procedures that are the consensus of the Public Safety Radio Services and Special Emergency Radio Service user agencies in this Region. If there is a perceived conflict then the judgment of the FCC will prevail.

3.1 **FEDERAL INTER-OPERABILITY:**
Interoperability between the Federal, State and Local Governments during both daily and disaster operations will primarily take place on the five common channels identified in the National Plan. Additionally, through the use of S -160 or equivalent agreements, a licensee may permit Federal use of a non-Federal communications system. Such use, on other than the five identified common channels, is to be in full compliance with FCC requirements for government use of non-government frequencies (Title 47 CFR, sec 2.103). It is permissible for a non-Federal government licensee to increase channel requirements to account for 2- 10 percent increase in mobile

units, dependent on the amount of Federal Government Agencies involvement in its area, provided that written documentation from Federal agencies supports at least that number of increased units.

4.0 **REGIONAL REVIEW COMMITTEE:**
Upon approval of this Plan by the Federal Communications Commission, a Region Review Committee will be established for the review of applications which do not fall within the stated guidelines provided for in this plan, to arbitrate disputes concerning this plan and/or its application, monitor compliance by existing users of their channel loading and other requirements and to formulate any necessary modifications to the Regional Plan as circumstances may require.

This Review Committee must be convened no later than six (6) months following the date on which the Region 22 Plan has been accepted by the FCC.

To maintain uniformity in its proceedings BY-LAWS

5. A member appointed by the President of the Minnesota Chapter of APCO.

6. A member appointed by the Minnesota Ambulance Association.

7. A member appointed by the Minnesota Chapter of the American Public Works Association.

8. A member of ASSHTO (American Association of State Highway and Transportation Officials) to represent Minnesota Highway Engineers responsible for highway maintenance radio systems.

9. A member appointed by the Association of Minnesota Emergency Managers.

10. A member appointed by the State of Minnesota's Commissioner of Public Safety.

11. A member appointed by the Governor of Minnesota.

Terms of membership to this committee should be defined in the BY-LAWS AND OPERATING PROCEDURES of the Review Committee.

Although the membership described above should encompass all expected users of these frequencies in the near future, the Chairperson must insure that all licensees have a voice in the proceedings of the Review Committee. This may require additional members from other user groups not specifically identified

5.1 **REGION DEFINED:**
Region 22 is the State of Minnesota. This region is the result of definition by the Federal Communications Commission as a result of recommendations made in the National Public Safety Planning Advisory Committee (NPSPAC) plan as submitted and approved and contained in Docket 87-112. For purposes of this plan the State of Minnesota shall be defined as all the lands and waters contained within the boundaries of the State of Minnesota.

5.2 **REGION PROFILE:**
The purpose of this section is to provide the basis for the assignment of frequencies, and their re-use. Since the frequency allocation formula used is based to a degree on population within a county, it is necessary to provide this information within this plan. Below is the data used in the determination of frequency allocations.

5.3 **POPULATION:**
The 1990 Census indicates a population of 4,375,099 for the State of Minnesota (Region 22). Population in each of the eighty-seven (87) counties within Region 22 is illustrated in EXHIBIT "C".

5.4 **GEOGRAPHICAL DESCRIPTION:**
There are 87 counties in the state with a total surface area of approximately 80,000 square miles.

Approximately 10% of the total surface area in the state is classified as water basins and wetlands.

The largest county is St. Louis, with a total area of 6,125 square miles. The smallest county in geographical area (154 square miles) is Ramsey, however it is the second most populated in the state and contains more than 11% of the state's total population. Hennepin County, with 611 square miles and adjacent to Ramsey, contains 23% of the state's total population.

The seven (7) counties comprising the Minneapoils/ St. Paul metropolitan area accounts for 52.3 % of the state's total population, yet only 3.5% of the total land area. Conversely many of the out-state counties have a relatively sparse population, however the state's four (4) smallest counties in geographical size are in the seven county Minneapolis/St. Paul metropolitan area and contain approximately 17 % of the state's total population.

As defined by the U.S. Census Bureau the population

of the state in the 1990 Census is classified as 69.9 % being URBAN and 31.1 % RURAL. This compares with the National Average of 75.2 % being URBAN. For purpose of definition, URBAN is considered a population of 2500 or more residents.

All of these items were taken under consideration in the allocation plan.

6.0 **USAGE GUIDELINES:**

All systems operating within the Region having five or more channels will be required to be trunked. The FCC, in its Report and Order states, "Exceptions" will be permitted on the trunking requirement only when a substantial showing is made that alternative technology would be at least as efficient as trunking or that trunking would not meet operational requirements. Exceptions will not be granted routinely, however, and strong evidence showing why trunking is unacceptable must be presented in support of any request for exception."

Those systems having four or less channels may be conventional or trunked although as counties experience rapid growth in the future it may be prudent for both economic and operational considerations that counties pool their channels and implement a multi-county trunked system.

Systems of four or less channels operating in the conventional mode who do not meet FCC loading standards will be required to share the frequency on a non-exclusive basis.

Public Safety communications at the state level, as it impacts the Region, will be reviewed by the Committee. State-wide public safety agencies will submit their communications plans for impact approval if they utilize communications systems within the Region and those portions of such systems must be compatible with the Regional Plan.

The next level of communication coverage will be a county/multiple municipality area. Those systems that are designed to provide area communication coverage must demonstrate their need to require such wide area coverage. This would apply in a situation such as a city requesting coverage of an entire county. Communication coverage beyond the bounds of a jurisdictional area of concern cannot be permitted unless it can be substantiated that such radio coverage is critical to the protection of life and property. If the 800 MHz trunked radio technology is utilized, the system design must include as many

county/multiple municipality government public safety and public service radio users as can be managed technically.

The county/multiple municipality agency (ies)), depending upon systems loading and the need for multiple systems within an area, must provide intercommunications between area-wide systems. In a multi-agency environment, a lead agency using the 800 MHz spectrum, which is an agency or organization having primary response obligations in the geographic area, shall be responsible for coordinating the implementation the Common Channels in this band as mandated by the National Plan. Such implementation must be reviewed and approved by the Local APCO Frequency Advisor, and at his/her discretion, the Regional Review Committee.

Municipal terminology often differs. In order to provide a title for the next level of communications the term "municipal" is used to define the level below county-wide. "Municipal" communications for public safety and public services purposes must provide only the communications needed within its boundaries. However, if the total number of radios in service does not reach minimum loading criteria for a trunked system, that agency must consider utilizing the next higher system level if 800 MHz trunked radio is available in the area. As those higher level systems reach capacity, the smaller system communicators in public safety and public service must then consider uniting their communications efforts to formulate one large system or forfeit use of the limited 800 MHz spectrum.

Where smaller conventional 800 MHz needs are requested, those frequencies to be utilized must not interfere with the region's trunked systems. The 800 MHz trunked radio system is to be considered the higher technology at this time and in greater compliance with FCC guidelines. The amount of interference that can be tolerated depends on the service affected. Personal life and property protection shall receive the highest priority and disruptive interference with communications involved in these services in an area shall not be tolerated. Any co-channel interference within an authorized area of coverage will be examined on a case by case basis by the Regional Review Committee.

6.1 **TECHNICAL DESIGN REQUIREMENTS FOR LICENSING:**

6.2 **DEFINITION OF "COVERAGE AREA":**
"Coverage area" referred to in this Plan is that

geographical area throughout which the applicant has primary jurisdiction, plus approximately three (3) miles, and throughout which the radio "base station (s)" to be installed are intended to provide a minimum received signal strength of 40 dBu (decibels above 1 microvolt, equivalent to approximately 4.6 microvolts across 50 ohms at 850 MHz) to the associated mobile stations.

6.3 **SYSTEM COVERAGE LIMITATIONS:**
Every effort must be made to ensure the most possible re-use (shared) of spectrum by confining signal radiation of a system to only the geographical area throughout which the applicant has primary jurisdiction. It is recognized however that radio signals do not stop at jurisdictional borders nor do jurisdictional boundaries rarely center around a selected transmitter site. All possible considerations however must be given in the system's design to achieve this balance of signal propagation

2. **MOBILE AND CONTROL STATIONS:**

(a) Mobile and Control stations from co-channel systems shall provide a minimum of 35 dB protection to other co-channel base receivers.

(b) Mobile and Control stations shall provide a minimum of 15 dB protection to receivers operating on next-adjacent-offset channels.

The use of "satellite receivers" should be used to enhance the talk-back of low powered transmitters.

The location and design of such systems however must anticipate the potential for interference from other systems operating within this plan's guidelines. The criteria listed above is intended to provide protection to only receivers located at the base or mobile relay station site.

Applicants choosing to operate a system with less than a 40 dBu signal contour within their coverage area should be cognizant that noticeable co-channel interference may be experienced from other co-channel users who have systems conforming to these radiated power limitations.

3. **USE OF FREQUENCIES IN AIRCRAFT:**

(a) The degree to which these 800 MHz channels are to be "re-used" within the Region and their assignments in adjacent Regions require that their use in aircraft be restricted. Limitations are:

(1) A maximum ERP of 1.0 watt above 500 ft. AGL.

(2) No transmissions on the "local channels" above 2,000 ft. AGL.

(3) No transmissions on "common channels" above 5,000 ft. AGL.

(4) Avoid using the input frequency to the mobile relay station and use the "talk-a-round" mode whenever possible.

6.4 **DETERMINATION OF COVERAGE:**

There are four variables used in determining the area of coverage of a proposed system. These variables are (1) the required strength of the received signal, (2) antenna height above average terrain (HAAT), (3) the effective radiated power (ERP) of the system, and (4) the type of environment.

Received Signal Strength:
For purposes of this plan, received signal strength shall be the determining factor which defines the actual boundary of a system. The signal level which marks the outer boundary of a system must not exceed 40 dBu.

Antenna Height:
Shall be the height of the antenna above the average terrain surrounding the tower site.

Effective Radiated Power (ERP):
The ERP is the transmitter output power times the net gain of the antenna system. The actual formula is:

ERP (watts) = Watts x antilog (Net Gain/10)

Environment Type:
OKUMURA/HATA METHOD - The Okumura method uses four different classifications to describe the average terrain around a transmitter site or area. The classifications are:

1-URBAN; Which is built-up city-crowded with large buildings or closely interspersed with houses and densely grown trees. This would include the downtown area of a major city.

2-SUBURBAN; WHICH is a city scattered with trees, houses and buildings. This would include the downtown area of a large city.

3-QUASI-OPEN; Is an area between suburban and open areas. This includes areas outside of city limits that have few buildings and houses.

4-OPEN; Is an area where there are no obstacles such as tall trees or buildings in the propagation path or a plot of and which is cleared of anything for 300 to 400 meters ahead. This would include farm land, open fields, etc.

The Okumura/Hata method is the method resident in the computer packing program to develop this plan. A minimum system shall be permitted without special consideration when it is limited to an HAAT of 100 feet and the transmitter is centrally located within the jurisdiction or jurisdictions participating in a system. In all jurisdictions, regardless of size, a maximum boundary radius of 8 miles shall be allowed

provided adequate measures have been taken to assure